No 31.

# THE Sidereal Messenger.

*Conducted by Wm. W. PAYNE,*

Director of Carleton College Observatory.

JANUARY, 1885.

## CONTENTS:

"He telleth the number of the stars; He calleth them all by their names."

ARTICLES: PAGE.

The Nebulæ.—Lewis Swift ..... 1
The Designation of Recent Comets.—William C. Winlock.. 5
Reports of European Observatories for 1883 ..... 8
The Laws of Falling Bodies.—J. Hagen ..... 15
Astronomical Journals ..... 17
The Occultation observed by Gilliss.—John Tatlock, Jr... 18
Report of the Committee on Standards of Stellar Magnitude ..... 20
Right Ascension Circle.—Henry Parkhurst ..... 23

EDITORIAL NOTES:

Faint Stars for Standards of Stellar Magnitude, (large chart for illustration).—Observations of Encke's Comet by Professor Young.—The re-appearance of Red Sunsets.—A Lunar Red Light.—A large bright Nebula.—Minimum of Algol.—Sun-spot Period, (illustration).—Proper Motion of Lacaille 239.—Note on a Southern Nebula.—"Gegenschein."—Professor G. W. Hough's Report.—Ephemeris of Comet Wolf, 1884.—Argelander's Durchmusterung.—Ephemeris of Tuttle's Periodic Comet, 1885.—State Astronomical Society in Indiana.—Hohwu's prices for Astronomical Clocks.—Dr. Morrison's Elliptical Elements of Barnard's Comet.—Dr. Vogel's opinion of the Objective of the great Vienna Refractor.—Subscriptions ..... Pages 24–32

BOOK NOTICE:

Bessey's Botany Briefer Course, Henry Holt & Co., Publishers.

ADVERTISEMENTS ..... Cover Pages.

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## DIFFRACTION GRATINGS.

Professor Rowland of the Johns Hopkins University has placed in my hands the distribution of the fine gratings ruled on his engine. The plates are ruled with 14,438 lines to the inch. Five sizes are ruled, viz. 1 inch 1½ in, 2 in, 3 in, and 5 in. For full information address, J. A. BRASHEAR, PITTSBURG, S. S. PENNA.

XUM

# The Sidereal Messenger.

Conducted by Wm. W. PAYNE, Director of Carleton College Observatory, Northfield, Minn.

"In the present small treatise I set forth some matters of interest to all observers of natural phenomena to look at and consider."—GALILEO, *Sidereus Nuncius*, 1610.

VOL. 4. NO. 1. JANUARY, 1884. WHOLE NO. 31.

## THE NEBULÆ.

LEWIS SWIFT.

The neglect with which that branch of astronomy—the nebulæ—has been treated, has been for many years, somewhat painfully apparent to me, though there are many reasons therefor. In the first place but very few persons possess sufficient interest in this subject to arouse any popular enthusiasm, and as telescopes of the largest size are necessary to see them at all, except a few of the brightest, astronomers have, to a very great extent, devoted their time and instruments to the more fascinating and, perhaps, more useful subjects of double-stars, the *Moon*, the *Sun*, etc. During the many years devoted to comet-seeking, I have invariably marked on one of my star-charts the position of every nebula revealed by my comet-seeker, (a 4½-inch refractor). This habit has saved me many hours of anxious watching to detect motion in a nebulous object found, which, at the time of finding, I could not determine whether it were a nebula or a comet. Recourse to my chart with its recorded nebulæ in the position observed, has settled the matter at once.

XUM

As soon as the 16-inch refractor of this observatory was mounted, I began the scrutiny of several of the most conspicuous nebulæ for the purpose not only of personal gratification, but also to discover, if possible, some new features overlooked by previous observers as delineated by them in pictorial illustrations. How next to impossible it is to make an accurate drawing of a nebula possessing, as some of them do, many intricate details, is known only to him who has made the attempt! And when to this is added the difficulties surrounding the engraver who, probably, never saw the object he essays to reproduce, it is not surprising that so few of the published illustrations are true to nature. The most difficult nebula for the draftsman is the great nebula in *Orion*. Although every astronomer, from HUYGHENS, its discoverer, (who made the first drawing in 1656), down to our own times, has made the attempt, we as yet have no exact representation of this marvelous object. Its unimagined number of details of exceeding intricacy and delicacy, set at defiance both the pencil of the draftsman and the tools of the engraver. An increase in the size of telescopes affords no relief, for all features seen with the smaller instruments are not only vastly changed in the larger, but new ones are brought out as well. Because the many delineations of this nebula are widely at variance, it is sometimes argued as evidence that a change in its brightness and general configuration is slowly going on. How fallacious this reasoning is, will appear from a consideration of the following curious, and to me unaccountable instances of abnormal seeing, or of discrepant drawing, or of both. On the assembling of our eclipse party at Denver, to observe the total eclipse of 1878, the chief, Prof. COLBERT, located in front of us about fifteen or twenty intelligent ladies and gentlemen, each equipped with a pencil and paper, on which was drawn one or more circles to represent the eclipsed sun. Each, without consultation with any other member of the class, was to make a drawing of the corona as accurate as possible in regard to size, position and general contour. A comparison of

these drawings with the utter absence of resemblance to each other or to the object itself, would astonish the gods. No two were alike in any particular, and the picture least resembling the reality was, strange to say, made by a skilled delineator. It appears, therefore, that to obtain a correct illustration of this remarkable nebula, recourse must be had to photography—nature's only artisan.

The great nebula in *Andromeda* has the honor of having been the first discovered, and it is also the brightest and most conspicuous of the five or six visible without a telescope from our latitudes. Down to 1612 this was the only nebula known. Forty-four years later, in 1656, (as before stated) the second—the one of which we have already spoken—the *Orion* nebula was added. In 1714 HALLEY published a list of four new ones, among them being the celebrated cluster, 13 MESSIER, in *Hercules*, which increased the number to six as he supposed, being ignorant that HEVILIUS had already prepared a list of sixteen. In 1755 LACAILLE's discoveries at the Cape of Good Hope had swelled the list to 64. In 1784, just a century ago, MESSIER's published catalogues contained 103 clusters and nebulæ whose given places had all the accuracy attainable by the primitive methods at his command. The world knew no more than this about the nebulæ until Sir WILLIAM HERSCHEL took up the subject of their discovery and investigation. In 1802 this mighty Nimrod of astronomy, who, while the world slept, hunted the sky over for these wonderful objects, issued a third catalogue containing an aggregate of 2500 nebulæ never before seen, which were discovered by means of telescopes of his own manufacture, much larger and more powerful than any previously made or thought possible. Since that time his further labors and the studies of Sir JOHN HERSCHEL, DUNLOP, LORD ROSSE, D'ARREST, LASSELL, TEMPEL, STEPHAN and others have brought to our knowledge about 6700,as seen from all latitudes. To this number must be added 197 discovered at this observatory, seven of which were found by my son, a lad of thirteen years of age. Since July 9, 1883, I have made the detection of new

nebulæ my special work, with what success will be seen above. The most of those discovered are of the last degree of faintness, or, according to Sir JOHN HERSCHEL's nomenclature, e. e. e. F. (exceedingly, exceedingly, exceedingly faint.) It is, therefore, not surprising that they should hitherto have been overlooked. I am certain that but for the superior excellence of the eye-piece used, fully one-half of them would never have been seen. It is a periscopic, originally made for my 4½-inch telescope, and, on the 16-inch instrument, gives a power of 132 and a field of 27′. This power is as high as most of the undiscovered nebulæ will bear, even with a telescope of 16 inches aperture. If a much higher power be used and the seeing be poor a few small stars close together will appear nebulous when, in fact, no nebulosity exists.

As before stated, on July 9, 1883, I began a systematic search, selecting for my field of observation the region between the head and third coil of *Draco*, and on that short night found fourteen. The next night's labor was rewarded by the discovery of seven. The seeing on both occasions was exceptionally fine, and superior to any subsequently had, especially since the appearance of the red sunsets, since which some of my faintest nebulæ have become invisible. It may be of interest to state in this connection that nearly three-fourths of the nebulæ discovered at this observatory are in *Draco*, and that the constellation is not yet half explored.

This observatory is situated in the most cloudy section, saving Alaska, in the United States, and since its telescope was mounted the hindrance of work from this cloudiness has been very great. Much time is, of course, also lost by moonlight, and about half the observing weather is given to comet-seeking. But for these drawbacks, added to the fact that during the entire year there are but few nights exquisite enough for such delicate work, my list of nebulæ would, I doubt not, have been much longer.

[*To be continued.*]

WARNER OBSERVATORY, November, 1884.

## THE DESIGNATION OF RECENT COMETS.

WILLIAM C. WINLOCK.

In connection with the list of comets which appeared in the September number of the SIDEREAL MESSENGER (vol. 3, p. 201) the following list of *Synonymes* of the more recent comets may be of assistance to any one attempting to collect observations of these objects, scattered with a confusing array of designations through astronomical periodicals of the last five years. And I would here call the attention of astronomers to a real source of annoyance, which a little care would obviate.

The question of the most appropriate method of designating comets has received some attention from time to time, but even in the *Astronomische Nachrichten* no uniform practice has existed. In the general register to the first twenty volumes, the comets are designated by the *year*, with a Roman numeral to indicate the order of discovery; in the register to the twenty-sixth volume, the Roman numeral shows, on the other hand, the order of perihelion passage. Dr. C. A. F. PETERS, the editor, urged in opposition to this plan of designating with Roman numerals according to date of perihelion passage, that a comet could not receive a name until its orbit was computed, and in case a sufficient number of observations was not obtained to determine the orbit, the plan failed entirely; and furthermore that as successive computers modified the elements, the designation of the comet might be changed accordingly. PETERS' proposition to return to the old designation, by order of discovery, brought forth protests from OPPOLZER and LITTROW, (*Astron. Nachr.* vol. 78, p. 319, 363-368) OPPOLZER proposing to introduce in a new manner the date of discovery as a provisional designation.

To avoid the ambiguity which would immediately arise in using the Roman figures with two entirely different significations, PETERS indicated the order of discovery by

the small letters *a*, *b*, *c*, This etc. was inaugurated with the comets of 1871 in volume 78, and continued to volume 101.

In volume 100 (*Astron. Nachr.* vol. 100, p. 369. Oct. 25, 1881). Dr. KRUEGER, who had become editor, announced that accordance with a resolution of the *Astronomische Gesellschaft*, the *letters* would be dropped in future volumes of the *Nachrichten* and in the publications of the *Gesellschaft*, and that comets would be designated I, II, III, etc., (with the year) in the order of passing perihelion. Until the time of perihelion was fixed beyond a doubt, the name of the discoverer with the year, or the date of discovery, would be sufficient.

In the table referred to on pages 201-205 of the SIDEREAL MESSENGER, the arrangement is according to the date of discovery. In the following list, the first column contains the arrangement and designation according to KRUEGER'S rule just given, and the second column gives the various additional appellations which the comet has received in our journals. For example: The Pons-Brooks' comet, being the first comet to pass perihelion in 1884, is called "Comet 1884, 1," but as it was the third comet discovered in 1883, it has also been called Comet (*c*) 1883. (The recommendation is that this latter method of designation be dropped, to save the useless duplication of names.) After the regular list for each year, below are given the "suspected" comets, or comets whose orbits could not be definitely settled, designated by the name of the observer or the date of observation. Even where these suspected comets have turned out to be nebulæ I have thought it worth while, in many cases, merely for the sake of convenience in reference, to insert them with a note, since mention may be found of them as comets, before the error was discovered.

| | |
|---|---|
| Comet 1880 I | = Comet (*a*) 1880. |
| | = Gould's Comet. |
| | = The Great Southern Comet of 1880. |
| Comet 1880 II | = Comet (*b*) 1880. |
| | = Schæberle's Comet. |

| | |
|---|---|
| Comet 1880 III | = Comet (*d*) 1880.<br>= Hartwig's Comet. |
| Comet 1880 IV | = Comet (*e*) 1880.<br>= Swift's Comet.<br>= Comet 1869 III (Tempel). |
| Comet 1880 V | = Comet (*f*) 1880.<br>= Pechule's Comet. |
| [Comet 1880 Cooper] | = Comet (*g*) 1880.<br>(Observations insufficient for a definite orbit). |
| Comet 1881 I | = Comet (*c*) 1880.<br>= Faye's Comet. |
| Comet 1881 II | = Comet (*a*) 1881.<br>= Swift's Comet |
| Comet 1881 III | = Comet (*b*) 1881.<br>= Tebbutt's Comet.<br>= The Great Comet of 1881 (erroneously referred to as Comet (*c*), 1881. See Mon. Not. R. A. S., vol. XLII, p. 78.) |
| Comet 1881 IV | = Comet (*c*) 1881.<br>= Schæberle's Comet. |
| Comet 1881 V | = Comet (*f*) 1881.<br>= Denning's Comet. |
| Comet 1881 VI | = Comet (*e*) 1881.<br>= Barnard's Comet. |
| Comet 1881 VII | = Comet (*d*) 1881.<br>= Encke's Comet. |
| Comet 1881 VIII | = Comet (*g*) 1881.<br>= Swift's Comet. |
| [Comet 1881 Barnard, May 12.] | Seen again on May 13 but not found afterwards |
| Comet 1882 I | = Comet (*a*) 1882.<br>= Wells' Comet. |
| Comet 1882 II | = Comet (*b*) 1882.<br>= Crul's Comet.<br>= Gould's Comet.<br>= Finlay's Comet.<br>= The Great Comet of 1882. |

| | |
|---|---|
| Comet 1882 III | = Comet (*c*) 1882.<br>= Barnard's Comet. |
| [Comet 1882, May 17] | = The Egyptian Comet. (Seen during the total solar eclipse, May 17, 1882, and shown on the photographs of the corona. No accurate observations of position). |
| Comet 1883 I | = Comet (*a*) 1883.<br>= Swift-Brooks' Comet. |
| Comet 1883 II | = Comet (*a*) 1884.<br>= Ross' Comet. |
| [Comet 1883, Swift, Sept. 11.] | (Proved to be a nebula). |
| Comet 1884 I | = Comet (*b*) 1883.<br>= Pons-Brooks' Comet.<br>= Pons' Comet, 1812.<br>= 1812 Comet. |
| Comet 1884 II | = Comet (*b*) 1884.<br>= Barnard's Comet. |
| Comet 1884, (Wolf) | = Comet (*c*) 1884. |
| [Comet 1884 Spitaler, May 26.] | (Possibly a return of Comet 1858 III. Lost after discovery.—No accurate observations obtained). |

WASHINGTON, D. C., Nov. 7, 1884.

## REPORTS OF EUROPEAN OBSERVATORIES, FOR 1883.

The *V. J. S. der Astronomischen Gesellschaft* for 1884 contains, as usual, reports from the various European Observatories. The following notes are condensed from these reports, and give a connected account of the activity of the various establishments for 1883:

### ATHENS.

The *Sun* was observed on 355 days; the *Moon* had 534 points determined in its topography; *Jupiter* was drawn 63 times.

A memoir on the Comet of 1882 is nearly ready for

printing. 39400 comparisons of variable stars were made.

BERLIN.

Dr. BECKER has left the observatory to take charge of the Gotha observatory.

The Zone $+20°$ to $+25°$ is finished so far as observations are concerned. To determine the influence of the magnitude of the stars on the deduced R. A., the transits of 247 stars were observed on 13 evenings, both with the full objective, and through wire nettings held in front of the objective, so as to reduce their magnitude to a given standard. It was found that faint stars were observed later by $0^s.007$ per magnitude.

It is mentioned in this report that two observers determined the places of 240 stars (using 57 fundamental stars for comparison) in four nights. One observer made the pointings, the other read the microscopes.

VOL. V of the Berlin Observations will shortly be printed

The Computing Bureau has issued the *Berliner Jahrbuch* as usual, as well as the two periodicals, *Circulars* and *Correspondence regarding observations of planets.*

BONN.

The observatory continues to concentrate its efforts on two great works: the *Zone* $40°-50°$, and the Southern *Durchmusterung.* In the latter work 114615+1161 stars have been observed. The observation and reductions of this work are now completed and the printing of the catalogue is begun.

BRUSSELS.

The catalogue of E. QUETELET is printed from $0^h$ to $12^h$. The labors of the observatory in Spherical Astronomy, in Physical Astronomy and Celestial Mechanics, as well as in regard to the Transit of Venus 1882, are described in the report.

DRESDEN (private observatory.)

Baron V. ENGELHARDT continues at his private observatory the observations of minor planets, of comets and of nebulæ. 21 planets have been observed 63 times; 3 comets

have been observed 43 times; 47 nebulæ have been observed 95 times.

DUSSELDORF.

In 1883, 18 planets have been observed 49 times; since 1847, 144 planets have been observed 1151 times.

Six asteroid orbits are computed yearly.

FRANKFORT (on the Main), (private observatory).

Herr EPPSTEIN has made since 1881, 444 gauges, containing 8332 stars in 113 positions on 23 nights. In all, about 47000 stars in 2426 fields in 774 positions.

Sun-spot observations are also regularly made by Herr EPPSTEIN.

GENEVA.

The 10-inch equatorial has been used for observations of nebulæ, double stars, asteroids and satellites of *Saturn*.

The small equatorial has been used to study the solar prominences.

GOTHA.

Dr. E. BECKER has lately been appointed to the charge of the Gotha observatory. The larger part of the report relates to repairs and to changes which have been made in the instruments.

Dr. BECKER continues the reductions of the Berlin Zone $+20°$ to $+25°$. The *Moon*, the inferior planets and those MAYER stars not in the *Fundamenta* will be observed on the meridian.

GRIGNON.

The observatory of the Priory of St. John of Grignon, was founded in 1879, and this report relates to its instrumental equipment, and to its observations of Sun-spots, planets and comets.

HERENY, (Hungary.)

Vol. I of its publications has been distributed. The observations relate to the spectra of fixed stars, of variables and of comets; as well as to drawings, etc., of *Jupiter* with meteorological observations.

KALOCSA.

The latitude of the observatory has been accurately deter-

mined. The *Sun* is regularly observed. Dr. BRAUN, the director, has contrived a *Trigonometer* with which any spherical triangle can be solved (to about 5′ of arc) with great facility. (22 triangles in 10 minutes.)

KIEL.

Several additions have been made to the instruments; notably a comet-seeker and a star-spectroscope.

The Chronometer observatory has been separated from the Kiel observatory, and constituted a distinct establishment under the charge of Dr. C. F. W. PETERS. The HELSINGFORS–GOTHA Zone is now printing. Kiel has been telegraphically connected with one of the longitude stations of the European *Gradmessung*.

The *Astronomische Nachrichten* is regularly published here.

LEIPZIG.

The changes to the instruments appear to be nearly completed. The observatory has acquired the astro-physical apparatus belonging to the late Professor ZOELLNER.

The work of observation and reduction of the Zone $+5^\circ$ to $+10^\circ$ continues, as well as the reduction of the old Zone $+10^\circ$ to $+15^\circ$.

LEIPZIG, (private observatory.)

Dr. ENGELMANN made in 1882, 1200 observations of 400 double stars; in 1883, 1600 observations of 540 double stars, as well as other observations.

*Victoria* and *Sappho* were observed to determine the solar parallax on Dr. GILL's plan.

LUND.

The Zone observations are finished. DR. DUNER has measured 80 double stars, 563 spectra of red stars and 55 wave lengths in star spectra of the III type. *Victoria* and *Sappho* have also been observed by Dr. ENGSTROM.

MILAN.

The 18-inch equatorial is not yet received.*

*It is understood that the cost of the Dome and Telescope is to be paid from a grant of 250,000 francs ($50,000.) The objective cost 45,000 fr. ($9,000) and is made by MERZ. The mounting (by REPSOLD) cost 65,000 fr. ($13,000.)

The 8-inch equatorial has been employed in making (395) observations of double stars, (64) observations of 3 comets, etc., etc.

The most interesting work of the observatory is the preparation of Baron DEMBOWSKI's observations for the press. They will be printed in two volumes. The contents of Vol. I is as follows:

I. 2100 measures of 611 stars made at Naples.

II. 2155 measures of 432 stars of OTTO STRUVE's Catalogue.

III. 663 measures of 199 stars whose distance is between 32″ and 120″.

IV. 1229 measures of 342 doubles discovered by BURNHAM.

V. 476 measures of 134 miscellaneous pairs.

VI. 919 observations of 26 circumpolar pairs.

In all 7542 measures.

Vol. II will contain 13800 measures of W. STRUVE's Dorpat catalogue.

MUNICH.

The repairs are nearly completed. Among the 37000 stars whose places have been fixed at Munich some 9000 have been only once observed and are in no other catalogue. These are to be each once observed.

The Munich Zones are being completely re-reduced and brought up to 1880.0 with comparisons with LALANDE, BESSEL, SANTINI, RUEMKER, SCHELLERUP, COPELAND and ARGELANDER.

O'GYALLA.

Stars are spectroscopically observed in the Zone 0° to −15°. These observations include stars to 7 magnitude and each star is observed twice. Special star spectra are more carefully investigated. Comet spectra have also been regularly observed. The color of all stars to 4 magnitude inclusive are observed with a ZOELLNER's colorimeter. The *Sun* was regularly observed (on 203 days.) Many other investigations are also in progress, for an account of which reference must be made to the original report.

PADUA.

The work of the observatory is intimately connected with that of the Italian Geodetic Commission.

PLONSK (private observatory.)

Solar spots are regularly observed, as well as the positions and spectra of comets and the relative situations of double stars.

POTSDAM.

Dr. VOGEL has had the privilege of using the large Vienna refractor during three months of 1883 for the investigation of the spectra of faint stars.

*Jupiter* and *Mars* have been regularly observed by Dr. LOEHSE.

Sixty-nine nebulæ have been observed for position with the heliometer.

The major planets (except *Uranus*) were photometrically observed each 5 times or more. Many variable stars have been observed. The *Sun* is observed constantly, and a great number of other researches are in hand.

PRAGUE (private observatory.)

Professor SAFARIK has made 1830 determinations of the magnitude of 97 variable stars on 161 nights, besides many other determinations of brightness as of the planets, comets, zodiacal light, etc.

STOCKHOLM.

Dr. GYLDEN's report relates chiefly to the progress made in his new method of determining the absolute elements of the eight major planets, and can not be summarized here.

The meridian-circle is devoted to the observations of all stars north of $+45^\circ$ which are in the Radcliffe catalogue.

ZURICH.

The *Sun* was observed on 302 days; 2400 single positions of solar spots have been determined. *Jupiter* has been observed on 28 days and observations of comets, etc., have been made.

## INTERNATIONAL MERIDIAN CONFERENCE.

The full text of the Final Act of the International Meridian Conference is given below, extracted from the official publications.

The President of the United States of America, in pursuance of a special provision of Congress, having extended to the governments of all nations in diplomatic relations with his own, an invitation to send delegates to meet delegates from the United States, in the city of Washington, on the first of October, 1884, for the purpose of discussing, and, if possible, fixing upon a meridian proper to be employed as a common zero of longitude and standard of time-reckoning throughout the whole world, this International Meridian Conference assembled at the time and place designated; and, after careful and patient discussion, has passed the following resolutions:

1. "That it is the opinion of this congress that it is desirable to adopt a single prime meridian for all nations, in place of the multiplicity of initial meridians which now exist."

2. "That the Conference proposes to the Governments here represented, the adoption of the meridian passing through the centre of the transit instrument at the Observatory of Greenwich, as the initial meridian for longitude."

3. "That from this meridian longitude shall be counted in two directions up to 180 degrees, east longitude being plus, and west longitude minus."

4. "That the Conference proposes the adoption of a universal day for all purposes for which it may be found convenient, and which shall not interfere with the use of local or other standard time, where desirable."

5. "That this universal day is to be a mean solar day; is to begin for all the world at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day and date of that meridian; and is to be counted from zero up to twenty-four hours."

6. "That the conference expresses the hope that as soon as may be practicable the astronomical and nautical days will be arranged everywhere to begin at mean midnight."

7. "That the conference expresses the hope that the technical studies designed to regulate and extend the application of the decimal system to the division of angular space and of time, shall be resumed, so as to permit the extension of this application to all cases in which it presents real advantages."

## THE LAWS OF FALLING BODIES.

PROFESSOR J. HAGEN, S. J.

Although the laws of falling bodies seem to have no direct bearing on astronomy, and, hence, to find no proper place in an astronomical paper, still the fact that the force of gravitation bears the name of one of the greatest astronomical geniuses, and has ever since engaged the attention of the greatest astronomers, surely entitles the SIDEREAL MESSENGER to open its pages to the following lines.

The writer wishes to communicate to such as are interested in teaching popular astronomy, his own experience in the class-room regarding the laws of falling bodies. Whilst he fully appreciates the experimental proof and even gives it the preference in point of time to any theoretical demonstration, he has found that only the latter, combined with the former, gives the student full satisfaction.

The following table is usually given in text-books as the result of experiment:

| Seconds. | Single spaces. | Velocities. | Total Spaces. |
|---|---|---|---|
| 1 | 1 | 2 | 1 |
| 2 | 3 | 4 | 4 |
| 3 | 5 | 6 | 9 |
| $t$ | $2t-1$ | $2t$ | $t^2$ |

In trying to explain or construct this table *a priori* from the very definition of a constant force, the teacher has to make his students suppose but one fact, viz.: that the

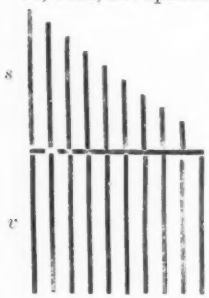
*velocity acquired by a falling body at the end of the first second is twice as large as the space fallen during that time.* For from this fact it follows that the spaces fallen during each second increase by two (column 2), as do the successive velocities themselves (column 3), while the total number of spaces fallen are but the result of the addition of the single spaces (column 4). But the student will ask why the velocity acquired after the first second is twice as large as the space fallen. This fact can be made evident to every one who knows that a rectangle is twice as large as a triangle of the same base and altitude.

The unit of time (a second) is mentally separated into an indefinite number of equal parts, which may conveniently, though not quite correctly, be called instants. During each of these instants, the attraction may be supposed momentary, not constant. Now, it is to be remembered,

(1) That the *motion* produced by these single momentary forces is *uniform, i. e.*, proportional to time, and,

(2) That the *velocities* acquired by these single forces are *alike.*

If, then, the spaces ($s$) and velocities ($v$) produced by these momentary forces are represented by straight lines and placed beside each other (see Fig.) the former will form a triangle, the latter a rectangle of the same altitude, *the more exactly so, the more instants there are in the unit of time,* and hence the law is proved in all rigor.




Though this geometrical demonstration is most simple in itself and may be found by any one, and is perhaps, not even new, the author wished to publish it that other teachers might enjoy that full satisfaction which he himself experienced in his pupils.

COLLEGE OF THE SACRED HEART,
Prairie du Chien, Wis.

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## ASTRONOMICAL JOURNALS.

Besides the transactions of learned societies which have astronomy for one of their objects, we have at present the publications of two societies which are exclusively devoted to astronomy. These are the *Monthly Notices* of the Royal Astronomical Society, and the *Vierteljahrsschrift* of the German Astronomical Society. Besides these there are several journals exclusively devoted to astronomy, of which the *Astronomische Nachrichten* and the *Bulletin Astronomique* are by far the most important.

The *Monthly Notices* are chiefly short papers read at the regular meetings of the society, and abstracts of the larger ones which are finally printed in full in the *Memoirs*. One number per year gives an interesting review of the work of the past twelve months, and a very full account of the proceedings of British observatories. The *Vierteljahrsschrift* devotes one of its four annual numbers to reports from the directors of observatories, chiefly in Germany and America. The other three numbers are largely devoted to reviews of published work. Some of these reviews are of the highest order. To quote only recent ones, we may name SCHOENFELD'S review of DREYER'S paper on the Constant of Precession, and AUWERS' review of GRANT'S Glasgow Catalogue.

The German Astronomical Society is also concerned in the publication of the *Astronomische Nachrichten*, both directly and through its member, Dr. KRUEGER, the editor.

The new impulse is plainly evident in the editing of this journal, which is of the best order, as will be evident to all its readers and contributors. Nothing passes without scrutiny, and, in a way, the editor makes himself responsible for the accuracy of the articles printed.

On the theory of editing which is adopted, nothing could be more satisfactory.

*Copernicus*, which had reached its third year of publication has lately been discontinued, to the regret of all interested in the maintainance of high class journals. But even

before its last number, it found a worthy successor in the *Bulletin Astronomique*, published by M. M. TISSERAND, RADAU, BIGOURDAN, and CALLANDREAU, in Paris. This journal has at once taken a very high rank. It contains observations, usually, such as are made at French observatories, just as the *Astronomische Nachrichten* contains series of observations from all over the world. The *Bulletin* publishes articles on special subjects, but its distinctive feature is monthly abstracts of other scientific journals in which the articles cited are accompanied by very full and complete reviews. In this way the *Bulletin* does for France what the *Nachrichten* and the *Vierteljahrsschrift* do for Germany, and what the *Monthly Notices* does for England. England has moreover, two special journals—the *Observatory* and the *Astronomical Register*, which cover slightly different fields; Germany has *Sirius*, and France has the new journal of FLAMMARION, *L'Astronomie*. In this country we have had the *Sidereal Messenger* of MITCHELL, the *Astronomical Notices* of BRUENNOW, and the *Astronomical Journal* of GOULD, all of which are now discontinued.

The SIDEREAL MESSENGER published by Carleton College Observatory is our only astronomical journal at this writing.

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*The Occultation Observed by* GILLISS *at Santiago de Chili, on Feb. 29th, 1852. By* JOHN TATLOCK, JR.

In the December number of the SIDEREAL MESSENGER for 1884, Mr. S. C. CHANDLER, Jr., makes mention of an occultation observed by Capt. GILLISS at Santaigo de Chili, and suggests that the star which neither Capt. GILLISS nor Mr. FERGUSON were able to identify subsequently, was *Eta Geminorum*. In accordance with Mr. CHANDLER'S suggestion, I have computed the relative places of the *Moon* and *Eta Geminorum* for the time of the occultation.

The data pertaining to the *Moon's* place, which were

kindly furnished me by Prof. NEWCOMB, are taken from the *Nautical Almanac* for 1852, and are as follows:

| Feb. 29, 1852. | $\alpha$ | | | $\delta$ | | | $\pi$ | |
|---|---|---|---|---|---|---|---|---|
| h | h | m | s | ° | ′ | ″ | ′ | ″ |
| 10 | 6 | 1 | 7.18 | +22 | 5 | 46.4 | 57 | 0.7 |
| 11 | | 3 | 27.92 | | 8 | 27.6 | | 2.9 |
| 12 | | 5 | 48.93 | | 11 | 1.5 | | 5.2 |
| 13 | | 8 | 10.23 | | 13 | 27.9 | | 7.5 |
| 14 | 6 | 10 | 31.81 | +22 | 15 | 46.9 | 57 | 9.9 |

The local mean time of the immersion is $7^h\ 40^m\ 48^s.3$, and using the longitude of Santiago, adopted by GILLISS, which is $+4^h\ 42^m\ 33^s.8$, the Greenwich mean time of immersion is $12^h\ 23^m\ 22^s.1$. For this epoch the *Moon's* apparent place from the above data is

$$\alpha' = 6^h\ 6^m\ 36^s.83$$
$$\delta' = +22^\circ\ 59'\ 24''.5$$

The place of *Eta Geminorum*, as given in NEWCOMB's Standard Stars, is for 1850.0

$$\alpha' = 6^h\ 5^m\ 49^s.39$$
$$\delta' = +22^\circ\ 32'\ 42''.0$$

from which we have the apparent place for Feb. 29th, 1852, as follows:

$$\alpha' = 6^h\ 5^m\ 56^s.67$$
$$\delta' = +22^\circ\ 32'\ 38''.8$$

The relative position of the *Moon* and star is then

$$\Delta\alpha = -38^s.16$$
$$\Delta\delta = -26'\ 45''.7$$

from which we find that the star, at the epoch given, was distant $12'.2$ from the *Moon's* limb in the direction of 198°. A rough computation of the phenomenon on the assumption that *Eta Geminorum* was the occulted star gave substantially the same result.

It is highly probable, although he makes no mention of it, that GILLISS himself may have surmised that *Eta Geminorum* was the star, for only a month before he had witnessed the rare phenomenon of a double occultation of this star, of which he makes mention in the introduction to the third volume of his report in the Expedition to Chili.

Astronomical Observatory,
Beloit College, Beloit, Wisconsin,
Dec. 20th, 1884.

*Report of the Committee on Standards of Stellar Magnitude.**

In selecting a series of stars as standards of stellar magnitude, it would obviously be impossible to choose those which should represent any assigned brightness. Stars could not be found which should have magnitudes of exactly, 1.0, 2.0, 3.0, etc. If the scale was made to conform to the stars, subsequent measures would be sure to show that its divisions were irregular. Moreover, an observer might have difficulty in determining fractions of a magnitude, if the light of all his comparison stars were expressed as integer numbers. A much more precise method seems to be, first, to select suitable stars as standards; secondly, to measure their relative light; and, thirdly, to express these measures in terms of any convenient scale of magnitudes that may be finally adopted. Subsequent measures will then serve to increase the accuracy with which this scale is defined, by determining more precisely the brightness of the comparison stars.

International co-operation is to be desired in order that the system recommended may be adopted by astronomers in all parts of the world. Accordingly, the Royal Astronomical Society and the *Astronomische Gesellschaft* were invited to aid in this work. A committee consisting of Messrs. HIND, KNOBEL, KNOTT, STONE and CHRISTIE was appointed by the Royal Astronomical Society, and Dr. SCHOENFELD was named as its representative by the *Astronomische Gesellschaft*. Unfortunately, the somewhat voluminous correspondence of your committee has been delayed by the great distances to be traversed, and, although the following plans are under consideration by the committees named above, final action has not yet been taken. Stars may be conveniently divided according to their brightness into three classes:—

* Philadelphia meeting of the A. A. A. S.

I. Lucid stars, or those brighter than the sixth magnitude. These stars will form the standards of comparison of the brighter variable stars, and in general for all observations made with the unaided eye or with an opera or field glass. Most of the photometric measures hitherto made relate to these stars.

II. Bright telescopic stars, from the sixth to the tenth magnitude. This class includes most of the catalogue stars, and will furnish the standards for the fainter variables. Meridian observations and those with small telescopes are in general directed towards these objects.

III. Faint telescopic stars, fainter than the tenth magnitude. Large telescopes are required for the convenient study of these stars. They will form convenient standards for the asteriods, for very faint variables, and for the components of clusters, etc.

It is proposed that the first of these classes be assigned to the Royal Astronomical Society, the second to the *Astronomische Gesellschaft* and the third to the American Association. In accordance with this scheme, the following plan is recommended for the fainter stars:

The standard stars to be so selected that they will form twenty-four groups near the equator, and at approximately equal intervals in right ascension. Each group to consist of a series of stars decreasing in brightness by differences of about half a magnitude, from the tenth magnitude to the faintest object visible in the largest telescopes. The groups to be located by bringing a star visible to the naked eye into the field of the telescope, waiting for two minutes, and then forming a chart of the zone ten minutes wide, passing through the centre of the field of the telescope during the next four minutes. This zone will therefore be defined as the region from five minutes north to five minutes south of the bright star, and from two to six minutes following it. The stars to be selected from this zone, which may in some cases have to be extended. Care to be taken that no star is near enough to another to be sensibly affected in appar-

ent brightness by its proximity. The following stars are proposed as leading stars for these groups:—

*γ Pegasi, θ' Ceti, α Piscium, α Ceti, γ Eridani, α Tauri, ε Orionis, γ Geminorum, α Canis Minoris, ε Hydræ, α Leonis, θ Leonis, γ Virginis, α Virginis, α Bootis, β Libræ, δ Ophiuchi, η Ophiuchi, η Serpentis, δ Aquilæ, θ Aquilæ, β Aquarii, α Aquarii* and *α Pegasi.*

Two other groups formed of stars near the poles to be added to these, with which all may be compared, to avoid large systematic errors is different right ascensions.

The advantages of this system are that an observer in any part of the earth and at any season will find comparison stars conveniently situated for observation. Moreover, he will often be able to bring some of the standard stars into the field without moving the dome or reading the finding circles of his instrument. This is a great advantage when working with a large telescope with which alone the smaller stars can be observed. The leading stars will also form convenient standards in observing the others photometrically. For this reason none fainter that the third or fourth magnitude have been selected.

If the above plans are adopted, Dr. C. H. F. PETERS will undertake the preparation of charts of the small zones. By the help of these the standards will be selected and their positions determined. Measures of their light will then, if desired, be undertaken at the Harvard College Observatory. It is greatly to be hoped that similar measures may also be made at some other observatories, and if possible by different methods. The owners of very large telescopes are also invited to examine these regions and locate very faint stars which may be beyond the reach of the other instruments employed in this work.

When the measurements are completed the light of all the standards selected will be expressed in such a scale as may seem best. Any observer may then compare the scale he is accustomed to use with this, by estimating the light of a number of comparison stars. Uniformity may

thus be secured where discrepancies amounting to several magnitudes now occur.

Respectfully submitted,

EDWARD C. PICKERING, Chairman.
LEWIS BOSS,
S. W. BURNHAM,
ASAPH HALL,
WILLIAM HARKNESS,
EDWARD S. HOLDEN,
SIMON NEWCOMB,
C. H. F. PETERS,
ORMOND STONE,
C. A. YOUNG,

## RIGHT ASCENSION CIRCLE.

During the last year I have had in use a right ascension circle, requiring no clock-work motion or setting during the evening, and making an hour-circle unnecessary and useless.

The right ascension circle moves with the telescope. The index is a complete time circle, graduated to 10 minutes of time, clamped to a fixed bar attached to the stand. The time circle is adjusted for the evening so that an index attached to the bar shall indicate the mean time of the sidereal noon. The right ascension may then be read opposite the mean time upon the time circle. At intermediate times, it is convenient to use for the index the next succeeding 10 minute division, adding the deficit of the time to the right ascension.

To facilitate setting the time circle (this is unnecessary, but, I think, useful), I have a fixed bar capable of being moved through an arc of 10°, with a rocking pawl falling into notches 2° apart. The sidereal noon index is only set on the 10th, 20th and last day of each month; and the remaining adjustment is made by the position of the pawl, which must correspond with the last figure of the day of the month; on the odd days being locked upon the left and on the even days upon the right. With this arrangement the almanac only needs to be referred to at intervals of a month or two, unless there is an interruption in the observations of several weeks at a time.

Brooklyn, N. Y., Dec. 20, 1884. HENRY M. PARKHURST.

## EDITORIAL NOTES.

The MESSENGER gratefully acknowledges the prompt renewal of so many subscriptions during the last month.

Considerable matter designed for amateur readers is deferred on on account of much other that deserves prompt attention.

### FAINT STARS FOR STANDARDS OF STELLAR MAGNITUDE.

The charts accompaning this circular represent four out of twenty-four regions, from which it is proposed to select certain stars for standards of the magnitude of faint stars. Additional information with regard to the plan is given in the printed reports sent herewith. The regions represented in these four charts are those from $2^m$ to $6^m$ following the bright stars $\gamma$ *Pegasi*, $\varepsilon$ *Orionis*, $\eta$ *Virginis*, and $\eta$ *Serpentis*. Each region extends $5'$ north and $5'$ south of the declination of the corresponding bright star.

It is desirable that these charts should be made as complete as possible, and it is hoped that astronomers having the use of powerful telescopes, will assist in accomplishing this object. They will confer a favor upon the Observatory of Harvard College by comparing these charts with the regions which they represent, and marking upon them the places of any additional stars which may be visible. Some indications of the comparative brightness of these stars would also be desirable.

Astronomers who may be disposed to take part in this work, are requested to send the chart of any particular region, as soon as possible after its revision, to the address given below.

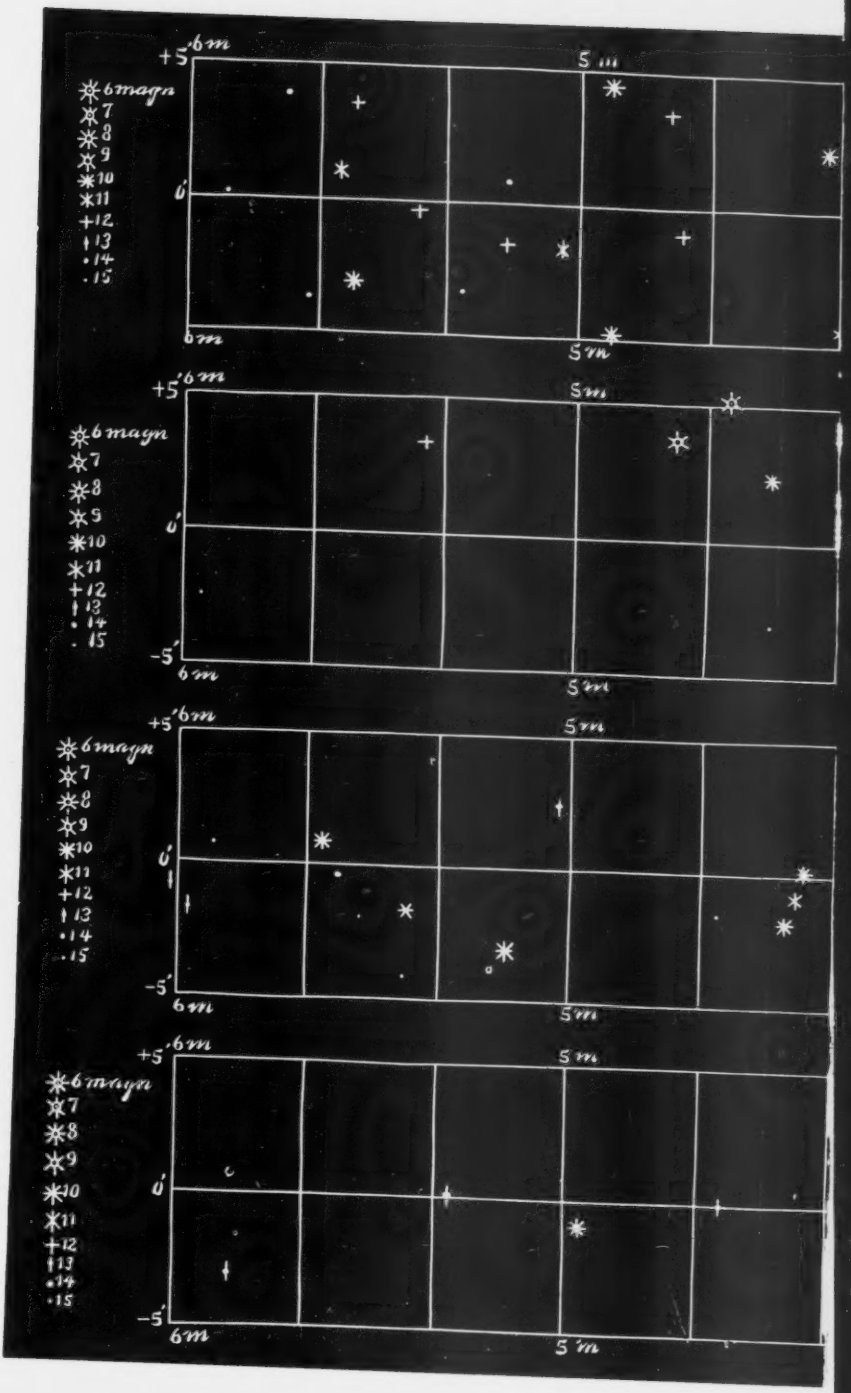
Harvard College Observatory,
Cambridge, Massachusetts, (U. S.)
Dec. 17th, 1884.

EDWARD C. PICKERING.

We are indebted to Professor YOUNG for the first notice received of the return of Encke's comet. From a private letter under date of Dec. 20, he says:

"I found Encke's Comet here on the evening of the 16th at the Halsted Observatory. It was *extremely* faint,—no nucleus or notable central condensation, and its form seemed, by averted vision, to be considerably irregular; but it was too faint to enable me to make out much more than that it was really there. My assistant in the dome also saw it. It was not distinct enough to allow an accurate determination of place; but by bringing it to the center of the field and reading the circles and clock, I got R. A. $= 22^h\ 45^m\ 10^s$, and Decl. $+ 3°\ 41'\ 30''$. The index errors of the instrument were determined by readings on Theta *Piscium* (R. A.$=23^h\ 22^m\ 08^s$; Decl.$+5°\ 44'\ 55''$),

XUM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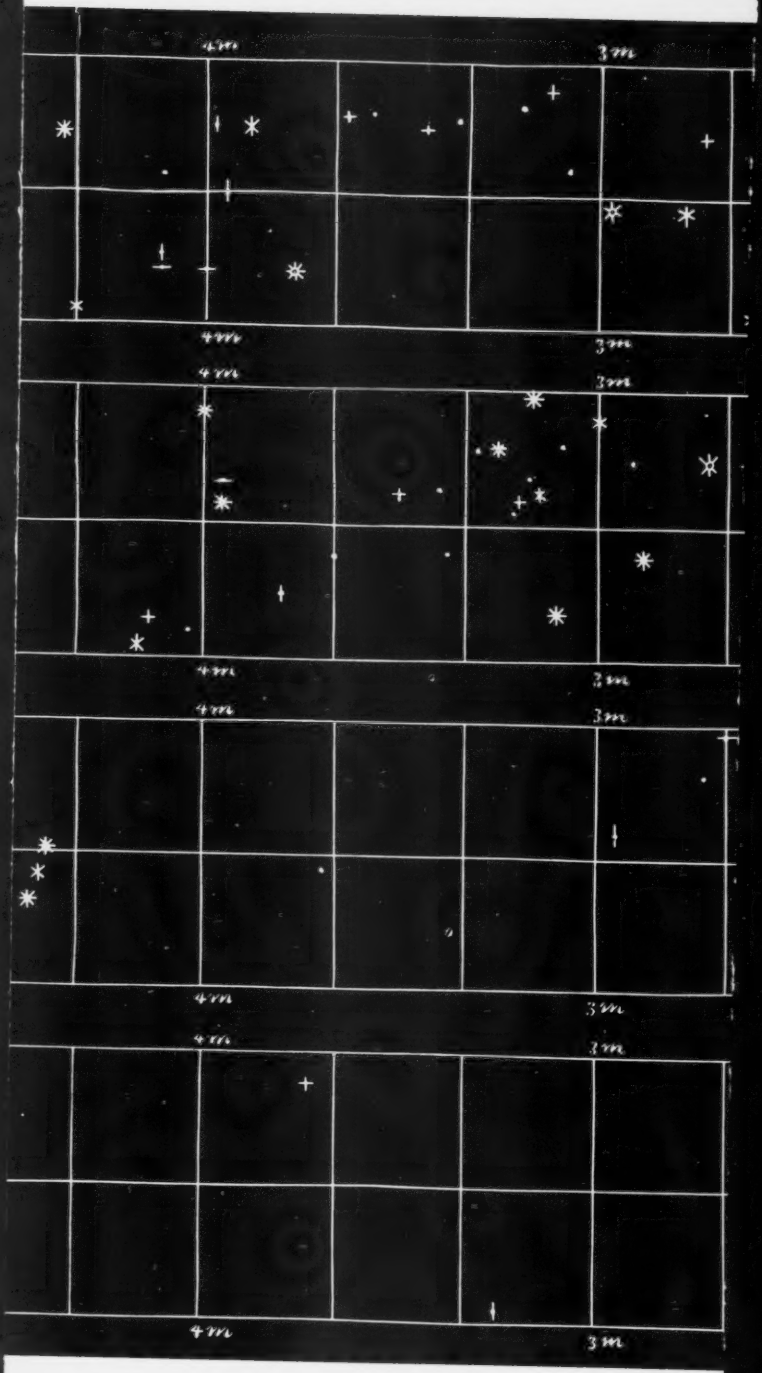
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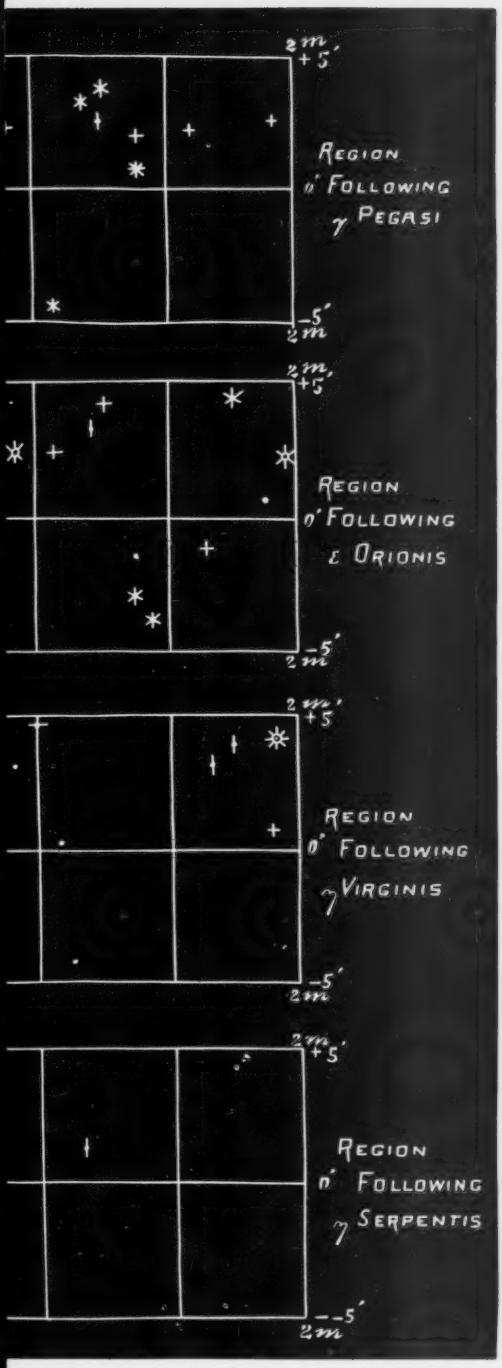
2m +5'
Region
0' Following
γ Pegasi
-5'
2m
2m +5'
Region
0' Following
ε Orionis
-5'
2m
2m +5'
Region
0' Following
γ Virginis
-5'
2m
2m +5'
Region
0' Following
γ Serpentis
-5'
2m

XUM

when it came to the same hour angle at which the comet was observed.

"Evidently BACKLUND's ephemeris is very close: at the time of observation it gives for the comet, R. A. = $22^h\ 45^m\ 39^s$, and Decl.+3° 41′ 57″, and I am not prepared to say that the possible error of my observed position may not amount to as much as the whole discrepancy."

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THE RE-APPEARANCE OF RED SUNSETS.

The language generally used to announce that the sunset "glow" has "re-appeared" this fall, is apt to mislead, conveying as it does the idea that the phenomenon, cause and all, had become *non est*, and now re-visits our atmosphere *de novo*.

A few observations and the deductions therefrom are worthy of record at this time, and this branch of the subject merits further examination and proof.

The claim is made in this note that the red glow, morning and evening, has merely been rendered invisible. The reasons for the claim appear below.

The red halo around the *Sun* was seen during the day time, and observed to merge into the red sunsets, before the latter commenced losing their prominence, say in May and June, 1884, thus establishing identity of causation.

This halo has been steadily seen during the whole summer, except on the few days when it was obviously shut out by cloud-forming conditions.

But it only began to be visible some while after sunrise and would disappear before sunset.

Many observations made before and after, both sunrise and sunset, when the heat of summer had passed, compel the conclusion that a little general haziness suffices to veil the whole phenomenon from sight.

On June 16th, 1884, I recorded, "The red halo is seen better when 'the *Sun* is out of lower strata of atmosphere."

On June 24th, 1884, "The halo has been very decided to day—blue 'sky in large patches, between well-defined *cumuli*,—redness is deeper 'than has been seen many times. * * * * When sunset passed 'the whole tint disappeared."

Without multiplying details which would fill pages, may it not be that the mist and haze, and the greater disturbance at sunrise and sunset of the lower air in summer, can account for the shutting out of the color? The "re-appearance" only dates since the fall rains and consequent clearer skies.

Information from two sources would be valuable, *i. e.*

From very elevated regions in the Northern Hemisphere, and from the Southern Hemisphere where winter has prevailed.

One writer speaking of the "intermission," as noticed at the north, under date Sept. 27th, says: "There has been no intermission what-'ever in the afterglow as observed in our parts of New South Wales, 'for, I think one year. I have observed it myself on nearly every night 'for that space—excepting cloudy days."

The persistence of the halo, though the morning and evening color has faded, seems to warrant the belief that the summer atmosphere near the horizon has to do with the "intermission" of the red sunsets.

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A LUNAR RED LIGHT.

It was my good fortune to observe a very interesting and unusual phenomenon on the evening of the 5th of December, 1884. Indeed, so far as I know, it stands unique, viz: a *lunar fore-glow or red light.*

On the date mentioned, about fifteen minutes before moonrise, upon a cloud in the eastern sky at an altitude of about twenty degrees, I noticed a pinkish tint which, in a few minutes, became intensified to a brilliant reddish glow, nearly equalling any display I have witnessed in connection with the *Sun.* The red light extended about thirty degrees in azimuth and was central over the *Moon,* which, although it had not risen, was plainly marked by a peculiar cone-shaped light extending from the horizon to the cloud upon which the red light was displayed. I gave the whole phenomenon a most careful study, and noticed a singular flashing of the red light similar to the aurora. The maximum of intensity was reached the instant before the upper limb of the *Moon* became visible. When the *Moon* was half way up the glow was scarcely visible, and when fully risen all trace of the wonderful light had disappeared. Three intelligent gentlemen of this place independently noticed the display and questioned me as to its probable character on the following day.

Red House Observatory, Dec. 16th, 1884. WILLIAM R. BROOKS.

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The large bright nebula to which Professor PORTER calls the attention of astronomers in the December number of SIDEREAL MESSENGER, I have been acquainted with for many years. I began the search for comets in 1857, and very soon after, I think the next year, I ran upon this object, and, finding it was not a comet, I supposed, of course, that an object so conspicuous was well known. The first intimation I had to the contrary, was in a communication from Dr. PETERS, in GOULD'S *Astronomical Journal,* Vol. V, page 16. He gives a list of 7 nebulæ, which he had observed in Naples, which were not in any catalogue, and this same nebula was one of the number. Thinking that so conspicuous a nebula could not have been overlooked, I commenced watching it for variability, and during 25 years no sign of change has been detected, either in size, shape, or brightness.

Warner Observatory, Dec. 19th, 1884. LEWIS SWIFT.

### EPHEMERIS OF COMET WOLF, 1884.

This ephemeris has been computed from the elements of Mr. S. C. CHANDLER, Jr., given in SIDEREAL MESSENGER, No. 29, and in *Ast. Nach.*, No. 2625, and may be found useful for the comparison of observations.

| Date, Berlin Mean Time. | App. $\alpha$ | | | App. $\delta$ | | | Log. $\Delta$ |
|---|---|---|---|---|---|---|---|
| | h | m | s | ° | ′ | ″ | |
| Sept. 17.5 | 21 | 14 | 20.70 | +23 | 38 | 8.7 | 9.912040 |
| 18 5 | | 14 | 39.04 | 23 | 13 | 18.3 | 9.910882 |
| 19 5 | | 14 | 59.52 | 22 | 48 | 4.5 | 9.909764 |
| 20.5 | | 15 | 22.95 | 22 | 22 | 22.4 | 9.908750 |
| 21.5 | | 15 | 48 82 | 21 | 56 | 15.5 | 9.907813 |
| 22.5 | | 16 | 17.80 | 21 | 29 | 43.3 | 9.906979 |
| 23 5 | | 16 | 49.23 | 21 | 2 | 50.2 | 9.906221 |
| 24.5 | | 17 | 23.48 | 20 | 35 | 36 5 | 9.905548 |
| 25.5 | | 18 | 0.53 | 20 | 8 | 2.2 | 9.904966 |
| 26.5 | | 18 | 40.19 | 19 | 40 | 10.2 | 9.904472 |
| 27.5 | | 19 | 22.70 | 19 | 12 | 1.5 | 9.904067 |
| 28.5 | | 20 | 8.13 | 18 | 43 | 39.0 | 9.903746 |
| 29.5 | | 20 | 56.45 | 18 | 14 | 3.1 | 9.903514 |
| Sept. 30.5 | | 21 | 47.38 | 17 | 46 | 14.3 | 9.903373 |
| Oct. 1.5 | | 22 | 41.13 | 17 | 17 | 14 8 | 9.903325 |
| 2.5 | | 23 | 37.64 | 16 | 48 | 6.7 | 9.903365 |
| 3.5 | | 24 | 36 72 | 16 | 18 | 51.5 | 9.903492 |
| 4.5 | | 25 | 38.53 | 15 | 49 | 29.9 | 9.903705 |
| 5.5 | | 26 | 43.07 | 15 | 20 | 3 6 | 9.904008 |
| 6.5 | | 27 | 50 24 | 14 | 50 | 34.5 | 9.904401 |
| 7.5 | | 29 | 0.23 | 14 | 21 | 3.2 | 9.904896 |
| 8.5 | | 30 | 12.78 | 13 | 51 | 34.4 | 9.905473 |
| 9.5 | | 31 | 27.89 | 13 | 22 | 2.6 | 9.906135 |
| 10.5 | | 32 | 45.64 | 12 | 52 | 34.8 | 9.906891 |
| 11.5 | | 34 | 5.80 | 12 | 23 | 12.0 | 9.907728 |
| 12.5 | | 35 | 28.56 | 11 | 53 | 54.6 | 9.908659 |
| 13.5 | | 36 | 53.91 | 11 | 24 | 43.6 | 9.909673 |
| 14.5 | | 38 | 21.63 | 10 | 55 | 41.0 | 9.910777 |
| 15.5 | | 39 | 51.85 | 10 | 26 | 48.7 | 9.911966 |
| 16.5 | | 41 | 44 47 | 9 | 58 | 7.2 | 9.953239 |
| 17.5 | | 42 | 59.93 | 9 | 29 | 39.3 | 9.914576 |
| 18.5 | | 44 | 37.14 | 9 | 1 | 23.5 | 9.916018 |
| 19.5 | | 46 | 16.28 | 8 | 33 | 23.3 | 9.917536 |
| 20.5 | | 47 | 58.13 | 8 | 5 | 39.3 | 9.919116 |
| 21.5 | | 49 | 42.20 | 7 | 38 | 12.8 | 9.920795 |
| 22.5 | | 51 | 28.43 | 7 | 11 | 4.5 | 9.922541 |
| 23.5 | | 53 | 16.84 | 6 | 44 | 15.7 | 9.924362 |
| 24.5 | | 55 | 7 20 | 6 | 17 | 46 6 | 9.926250 |
| 25.5 | | 56 | 59.64 | 5 | 51 | 39.6 | 9.928209 |
| 26.5 | 21 | 58 | 53.96 | 5 | 25 | 55.6 | 9.930236 |
| 27.5 | 22 | 0 | 50.28 | 5 | 0 | 33.5 | 9.932331 |
| 28.5 | | 2 | 48 44 | 4 | 35 | 35.7 | 9.934491 |
| 29.5 | | 4 | 48.42 | 4 | 11 | 2.4 | 9.936716 |
| 30.5 | | 6 | 50.20 | 3 | 46 | 54.3 | 9.939002 |
| Oct. 31.5 | | 8 | 53.56 | 3 | 23 | 12.1 | 9.941343 |
| Nov. 1.5 | | 10 | 58.64 | 2 | 59 | 56.4 | 9.943748 |
| 2 5 | | 13 | 5.28 | 2 | 37 | 7.6 | 9.946206 |
| 3.5 | | 15 | 13.46 | 2 | 14 | 46.2 | 9.948723 |
| 4.5 | | 17 | 23.14 | 1 | 52 | 52.5 | 9.951289 |
| 5.5 | | 19 | 34.22 | 1 | 31 | 27.6 | 9.953907 |
| 6.5 | | 21 | 46 73 | 1 | 10 | 31.6 | 9.956576 |
| Nov. 7.5 | 22 | 24 | 0.55 | 10 | 50 | 3.7 | 9.959294 |

In this connection it may be worth while to notice that in Mr. CHANDLER'S elements as printed in the *Ast. Nach.*, the log. $a$ in the equation of the co-ordinate $x$ should be 9.992051 instead of 9.99905.

JOHN TATLOCK, JR.

ARGELANDER'S DURCHMUSTERUNG.

It appears from Bonn Observations, vol. iii, p. v., that the observations were made with a comet-seeker of 34 lines aperture (3.02 English inches), and a magnifying power of 10 diameters. It does not appear to have been remarked that a magnifying power of 15 would have been necessary to utilize the whole aperture.

EPHEMERIS OF TUTTLE'S PERIODIC COMET, 1885.

Professors ORMOND STONE and P. P. LEAVENWORTH, Leander McCormick Observatory, University of Virginia, have computed an ephemeris of TUTTLE'S periodic comet, based on the observations of 1858 and 1871, in which perturbations have received attention. The circular contains the daily ephemerides of the comet from Aug. 10 to Oct. 19, 1885, and will be published in time for early search.

Mr. C. P. JACOBS of Indianapolis, Ind., has taken first steps recently, in organizing a State Astronomical Society, and, among others, such persons as the following are giving favorable attention to this worthy undertaking: Professor D. KIRKWOOD, of the State University; Professor D. E. HUNTER, Washington, Ind.; Professor A. B. CHAFFEE, Franklin College, and Mr. WM. DAWSON, Spiceland, Ind. Of his own work Mr. JACOBS says:

"I have procured a new equatorial mounting for my instrument, which I have just set up and it promises to work admirably. It was designed and constructed by Mr. H. C. WILLIAMS, of this city. The whole of it is solid, and seems to be accurate, and the working parts are nickle plated. The circles are 10 inches in diameter, and are graduated, the declination to 15 minutes, reading to $1^m$ $30^s$ with vernier, the hour-circle to minutes reading to 5 seconds with vernier. My glass, as perhaps you know, was re-made last year by JOHN BYRNE, of New York, has an aperture of 4 inches, and is excellent, both for light and diffinition.

"Mr. WILLIAMS has recently completed and mounted, equatorially, for himself, an 8½-inch Newtonian reflector, and is now grinding a 12-inch for another party. Both of these are silver on glass.

"Mr. PETITDIDIER, whose name appears with mine on the circular, now resides in St. Louis, Mo., being an assistant in the office of the U. S. Engineers in that city. Before leaving here he made and mounted for his own use, an 8½-inch reflector, and has made a smaller one for a party in Cincinnati. The bringing of my telescope here, as you will see, has developed considerable local enthusiasm and scientific enterprise."

Mr. JACOBS' popular addresses, in which are given his theory of the *Sun's* light and heat, are receiving favorable comment. We have already given the substance of this new theory, and, although it is ingenious and possibly true, it is now difficult to prove or disprove it.

I have just received a letter from A. HOHWU, maker of Astronomical clocks, Amsterdam, in which he askes me to make known in America that his price for the very best clock is $360, and that he is

now prepared to make a clock which he warrants satisfactory for $300. The latter clock differs from the first only in small details of execution. I take pleasure in complying with his request, as my experience with his clock, No. 32, has been very satisfactory. This clock has been running at the Washburn observatory for nearly four years. When the movement is clean and the clock mounting perfectly firm, I find that its daily change of rate is not more than 0ˢ.03.

Washburn Observatory,
University of Wisconsin,
Dec. 4th, 1884.

EDWIN S. HOLDEN.

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The printer's miserable failure to correct marked errors in the proof of the elements of BARNARD'S Comet by Dr. MORRISON, in the last number of the MESSENGER makes it simply just to print them in full a second time.

ELLIPTICAL ELEMENTS.

Epoch 1884, Sept. 24.5, Washington mean time.

| | | | | |
|---|---|---|---|---|
| $M$ = | 7° | 13′ | 19″.52 | Mean Equinox, 1884.0. |
| $\omega$ = | 300° | 57 | 44 .43 | |
| $\Omega$ = | 5 | 11 | 23 .56 | |
| $i$ = | 5 | 27 | 18 .94 | |
| $\varphi$ = | 35° | 37 | 2 .50 | |
| Log. $a$ = | 0.4862043 | | | |
| Log. $q$ = | 0.1069968 | | | |
| Log. $\mu$ = | 2.8207001 | | | |
| Period = | 1958.4158 days. | | | |

| | *C—O* | |
|---|---|---|
| | $d\,\lambda \cos.\,\beta$ | $d\,\beta$ |
| Aug. 12, | + 6″.52 | − 3″.21 |
| Sept. 15, | + 9″.85 | − 8″.09 |
| Oct. 14, | +31″ (?) | +14″.(?) |

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DR. H. C. VOGEL'S OPINION OF THE OBJECTIVE OF THE GREAT VIENNA REFRACTOR.

(*Publicationen des Astrophysikalischen Observatorium zu Potsdam, Volume IV. page 7.*)

[Translation.]

"In the spring months (1883) when there were several consecutive days of exquisitely clear weather, I got the impression that the objective was rather good, but that the images as regards sharpness were not to be compared with those of middle sized instruments, and on leaving Vienna I had formed the opinion that the difficulty of producing so large objectives had not been quite surmounted, and that the advantage of large objectives principally consisted in the amount of light through which much detail would be revealed (though not with the sharpness of middle sized instruments), which by a smaller amount of light would quite escape the eye of the observer.

"But by my observations in September, this opinion was completely upset. I have acknowledged that the Vienna objective as regards

the precision of the images leaves nothing to be desired, and that it was only from want of taking the state of the air into account that I had formed my former opinion. I have with advantage, on splendidly clear evenings in September, used a power of 1000 and even of 1500 and perceived the fine details of planetary disks with admirable sharpness. The images of bright stars were of perfect regularity and the central part of the diffraction disk was so remarkably small, that it may be expected that the instrument would also be very suited for observing double-stars."

PROPER MOTION OF LACAILLE 239.

This star has a proper motion of about $+0^s.050$ in R. A. with no proper motion in Dec. It has been observed since LACAILLE by ARGELANDER, YARNALL, GOULD and STONE. EDWARD S. HOLDEN.

NOTE ON A SOUTHERN NEBULA.

The large nebula mentioned by Professor PORTER on page 314 of the last number of the MESSENGER, has been repeatedly seen in my comet sweeps for the last four years, and it always appears the same. It is large, round, pretty bright,—irregularly bright,—like a flat disk with darkish smear across part of it. E. E. BARNARD.

"GEGENSCHEIN."

This object has been almost constantly visible during the last few months. It is sometimes roundish and at other times elliptical. On Nov. 10, 1884, it was large and elliptical, the axis being as 1:2, the major axis lying approximately east and west. Its center was in a line from *Eta Tauri* (Alcyone) to *Alpha Arietis* at $10^h\ 15^m$.

Vanderbilt University Obs'y. E. E. BARNARD.

The report of Professor G. W. HOUGH, of Dearborn Observatory, Chicago, is received as we go to press. It contains a summary of important work in observation during 1884, on Pons-Brooks' Comet, difficult double-stars, the planet *Jupiter*, the satellites of *Uranus*, and miscellaneous observations. The study of the markings of the surface of *Jupiter* are so instructive that it will be presented fully later.

Of the planet *Saturn*, Professor HOUGH reports as follows:

Near the time of opposition the planet *Saturn* was frequently examined when the seeing was first-class, by Mr. S. W. BURNHAM and myself, in order to detect markings on the rings, if any exist.

All our observations hitherto made on this planet in this respect have been negative. While the two rings have been seen sharply defined, and the boundary of the dusky ring well seen, nothing indicating a division in the outer ring has ever been noticed. We believe any such division subtending an angle of one-half second of arc, would not have been passed over.

It is well known, however, that a division in the outer ring has

been alleged to exist, by a number of astronomers using telescopes of much less optical power than our own.

If the phenomenon is real, the most plausible explanation would be to consider it periodic, depending on the rotation of the ring. If such be the case, it is easy to understand how it might escape notice.

The belts on the disc of the planet were at times quite conspicuous and very sharply defined, but we were unable to find any spot or marking by which to observe rotation.

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MINIMUM OF ALGOL.

November 9th, the minimum of *Algol* occurred at $7^h\ 23^m$, 75° meridian time. I made observations every few minutes, commencing about 6 o'clock. I compared *Algol* with *Rho*, a star of the fourth magnitude, and *Omega* and *Pi*, stars of the fifth magnitude. This group of stars was in the finder, and was separately distinct in the telescope for comparison, until I noticed a sensible increase in the brightness of *Algol*, which was apparent about eight o'clock. I therefore determined the minimum to be within fifteen minutes of $7^h\ 30^m$ on the day and time before mentioned. G. G.

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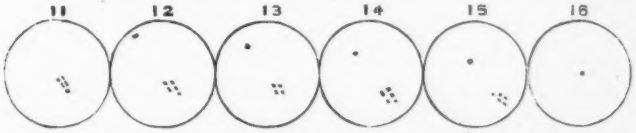
Professor TODD in his note on the Sun-spot period in the last number of the SIDEREAL MESSENGER, differs so widely from my observations that I can not but refer to it.

It has been my custom for years to take (on all possible occasions) daily observation of the *Sun*, and to note in a circle corresponding to the day of the month what I find on the face of the great luminary. The annexed diagram copied from my observing-book, will fully explain my mode of work.

*November, 1884.*




It will be observed that there is a regular progression of spots preceding, covering and following the dates given by Professor TODD. Again, October 9th, 1882, I note two spots. At other dates we agree. G. G.

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The following orders and subscriptions have not been previously acknowledged: Miss E. Walter, Mt. Pleasant, Pa.; F. J. Blinn, East Oakland, Cal.; Dr. L. Swift, Rochester, N. Y.; Prof. D. Kirkwood, Bloomington, Ind.; Chicago Public Library, Chicago, Ill.; Library State Normal School, (Vols. I, II and IV,) Ypsilanti, Michigan; Charles P. Jacobs, Indianapolis, Ind.; Library Wellesley College, Wellesley, Mass.; Arthur C. Perry, New York City, N. Y.; Prof. J. Tatlock, Smith Obs'y, Beloit, Wis.; Prof. R. C. Crampton, Jacksonville, Ills.; John W. Osgood, Cincinnatus, N. Y.; George Gildersleeve,

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BOOK NOTICE.

*Bessey's Botany Briefer Course.* HENRY HOLT & Co., New York.

A copy of this publication has recently come into our hands and has been read with interest.

The publication of the original and larger work was a public expression of a change which had been going on for a long time.

In methods of presenting the natural sciences not yet so old as to be beyond the memory of young men, it was the custom to present such generalizations as are involved in classification without any preliminary demonstration of the facts which give foundation to such arrangements. The fact that botanical classification has been worked out much more thoroughly than that of Zoology and that so admirable a system of determination has been elaborated has contributed to retard the change from classification to structure.

The publication of these volumes of Professor BESSEY makes possible to many teachers what they have long desired. Teachers of this branch are not so ignorant of what is desirable as their work would sometimes seem to indicate. The lack of a work treating comprehensively the essential features of Botany has been an impassable barrier.

The Briefer Course is not simply a condensation of the larger work. There is none of that dryness which is the usual result of simple condensation. No essential element of the larger work is lacking in this. There is the same comprehensiveness and the same judicious leading of the student to personal observation.

One commendable feature of the book is the fairness with which all branches of the great vegetable kingdom are treated. Hitherto the student of Botany has been led to think that flowering plants were the only real thing and that the rest, except, perhaps a few of the vascular cryptogams were mythical, or, at least, not to be understood by ordinary mortals.

Of two things Professor BESSEY'S work is an exponent: of the present state of our knowledge regarding plant life; and of that method of studying the observational sciences which is, or is rapidly coming to be, recognized as the true one. Compact, comprehensive, well written,—with these characteristics the Briefer Course cannot fail to meet with a welcome from many teachers of Botany.

Carleton College. L. W. C., JR.

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Term Examinations March 18 and 19, 1885.
Spring Term begins Wednesday, April 1, and ends June 18, 1885.
Examinations to enter College, June 12 and 13, and Sept. 8, 1885.
Term Examinations, June 16 and 17, 1885.
Anniversary Exercises, June 15–18, 1885.
Exhibition at the Art Room of work of Pupils in Drawing and Painting, June 15–18, 885.
Wednesday, September 9, 1885, Fall Term begins.
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